

Business models for electric vehicle charging infrastructure providers in the context of energy communities.

Overview

Renewable Energy Communities (RECs) and Citizen Energy Communities (CECs) have been introduced in EU legislation within the recast of the Renewable Energy Directive [1] and the Electricity Market Directive [2], respectively. After a successful transposition into the national legislation of individual EU member states, the number of operational energy communities (ECs) has been increasing ever since. At the same time, the share of electric vehicles (EVs) is increasing continuously in almost all EU member states [3] (e.g. Austria expects an increase in EVs from 44,507 end of 2021 [4] up to 1.3 million in 2030 [5].) However, only a limited number of EV owners are in the comfortable situation to be able to charge their EVs directly at home, e.g. with self-generated electricity from their privately-owned rooftop PV system. This implies that the vast majority of EV owners (e.g. living in multi-apartment buildings, in rented buildings, or simply cannot afford to install a PV system) have to rely on the offers of conventional charging infrastructure providers, making the operational costs of EVs higher than they need to be.

Methods

ECs have the potential to ameliorate this situation: EV owners could decide to participate in an EC with the goal to charge their EVs with cheaper electricity from the community¹. The full potential of such idea can be best harvested in cooperation with professional charging infrastructure providers, willing to set foot into a new field of business and cooperate/engage with ECs. For that, however, the development of suitable business models is of highest relevance. Thus, the objective of this work is to develop, investigate and assess business models for charging infrastructure providers in the context of ECs. This constitutes a multi-layered problem, since the business models need to cover the expenses and efforts of the charging infrastructure providers on the one hand, but still need to be affordable for ECs on the other. In order to take into account different viewpoints and angles, a mixed-method approach is applied for business model development. The business model canvas is used for a fundamental draft of different business models and is complemented with semi-structured interviews with infrastructure providers and professional EC operators. In the following, one exemplary business model shall be introduced.

Results

In this business model, it is assumed that the charging infrastructure provider actively participates in the EC by installing and operating charging points. Each charging point² (=metering point) would be considered an individual 'consumer' from the viewpoint of the EC, despite different EC participants would use the charging point to charge their EVs. This makes it necessary for the charging infrastructure provider (who is also the owner of the charging point) to purchase energy from the EC and further bill the consumed amounts to the different EC participants who charged their EVs. Speaking in terms of the business model canvas, the most important components forming the cost

¹ It is assumed that an EC would choose the EC-internal energy price such that consumers as well as prosumers/generators benefit financially. Thus, from a selling participant's perspective the EC-internal energy price needs to be higher compared to a conventional feed-in tariff (selling the surplus to a supplier). From a purchasing participant's perspective, the EC-internal energy price should be cheaper than the price of purchasing energy from a conventional supplier.

² If a charging point has multiple charging stations, this is also possible. Such situation would just require the respective number of sub-meters.

structure of a charging infrastructure provider would encompass (i) costs for infrastructure installation, (ii) maintenance costs, and (iii) costs for purchasing energy from the community (incl. grid charges). The revenue streams of an infrastructure provider would encompass (i) the billing of energy sales to the EC participants based on their charging activities, together with (ii) fixed fees for charging infrastructure operation and maintenance. While it is obvious that a charging infrastructure provider needs to recover their total expenditures over a certain period of time, it is still necessary to take into consideration that the offered energy price for EV charging still needs to be cheaper compared to the offers of conventional, non-EC-related charging infrastructure providers.

Conclusions

Results have indicated that the size of the EC (in terms of participating entities) is a crucial factor for the practical applicability of business models, because the larger the EC, the better fixed costs associated with the charging infrastructure provider can be distributed. In this respect, it might be of interest to investigate, whether multiple ECs could 'share' charging infrastructure – which would open up possibilities also for comparably small ECs (with a limited number of participants). This would then result in a setting where a charging infrastructure provider either participates in multiple ECs simultaneously (e.g. in Austria, legislation foresees multiple participation) or holds contracting agreements with multiple EC simultaneously.

References

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